

**WHAT IS CLAIMED IS:**

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1           1.       A monolithic microwave integrated circuit, comprising:  
2                    an amplifier circuit having a group delay variation verses frequency  
3       characteristic; and  
4                    a group delay equalizer circuit integrated with said amplifier circuit to  
5       compensate for said group delay variation verses frequency characteristic of said amplifier  
6       circuit.

1           2.       The circuit of Claim 1, wherein said amplifier circuit is capable of receiving an  
2       input signal having a frequency range, amplifying said input signal and producing an output  
3       signal corresponding to said amplified input signal, said group delay equalizer circuit being  
4       further capable of maintaining near constant group delay of frequencies within said frequency  
5       range of said input signal to prevent distortion of said output signal.

1           3.       The circuit of Claim 1, wherein said group delay equalizer circuit comprises  
2       between 3 and 20 percent of the area of said monolithic microwave integrated circuit.

1           4.       The circuit of Claim 1, wherein said group delay equalizer circuit is capable of  
2       compensating for said group delay variation verses frequency characteristic of said amplifier  
3       circuit to frequencies above 50 GHz.

1           5.     The circuit of Claim 1, wherein said amplifier circuit is a distributed amplifier  
2 circuit.

1           6.     The circuit of Claim 5, wherein said distributed amplifier circuit comprises one  
2 or more stages, each of said one or more stages including a common source field-effect  
3 transistor, a bipolar transistor or a cascode field-effect transistor structure.

0 1           7.     The circuit of Claim 1, wherein said amplifier circuit is a feedback amplifier  
2 circuit.

1           8.     The circuit of Claim 1, wherein said group delay equalizer circuit comprises  
2 one or more sections, each of said sections having a different group delay response.

1           9.     The circuit of Claim 8, wherein at least one of said one or more sections is  
2 placed at the input of said amplifier circuit.

1           10.    The circuit of Claim 8, wherein at least one of said one or more sections is  
2 placed at the output of said amplifier circuit.

1           11.    The circuit of Claim 8, wherein at least one of said one or more sections is  
2 placed between one or more stages of said amplifier circuit.

1           12.     The circuit of Claim 8, wherein said one or more sections are cascaded  
2 together to form a composite group delay response capable of compensating for said group  
3 delay variation verses frequency characteristic of said amplifier circuit.

1           13.     The circuit of Claim 8, wherein at least one of said one or more sections has  
2 least one microstrip line inductive over a specific frequency range and at least one capacitor to  
3 create a specific phase response over at least a portion of the frequency range of said amplifier  
4 circuit.

1           14.     The circuit of Claim 13, wherein at least one of said one or more sections is a  
2 filter selected from the group consisting of: an LC filter, a bridged LC filter, an RC filter and  
3 an RLC filter.

1           15.     The circuit of Claim 13, wherein at least one of said one or more sections is a  
2 filter with a microstrip transformer.

1           16.     The circuit of Claim 1, further comprising:  
2                   a substrate, said amplifier circuit and said group delay equalizer circuit being  
3 fabricated in said substrate.

1 17. The circuit of Claim 16, wherein said substrate is made from a material selected  
2 from the group consisting of: a III-V material, a II-VI material and a heterostructure material.

1 18. The circuit of Claim 1, wherein said group delay equalizer circuit is further  
2 capable of allowing a near constant gain response to be achieved over the frequency range of  
3 said amplifier circuit.

1 19. A method for providing a near constant group delay over a frequency range of  
2 a amplifier circuit, comprising the steps of:

3 providing said amplifier circuit within a monolithic microwave integrated  
4 circuit, said amplifier circuit having a group delay response variation verses frequency  
5 characteristic; and

6 integrating a group delay equalizer circuit with said amplifier circuit on said  
7 monolithic microwave integrated circuit to compensate for said group delay variation verses  
8 frequency characteristic of said amplifier circuit.

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1           20.    The method of Claim 19, further comprising the steps of:  
2                    receiving an input signal having a frequency range at said amplifier circuit;  
3                    amplifying said input signal to produce an output signal corresponding to said  
4   amplified input signal; and  
5                    maintaining, by said group delay equalizer circuit, near constant group delay of  
6   frequencies within said frequency range of said input signal to prevent distortion of said output  
7   signal.

1           21.    The method of Claim 19, wherein said group delay equalizer circuit comprises  
2   between 3 and 20 percent of the area of said monolithic microwave integrated circuit.

1           22.    The method of Claim 19, wherein said step of integrating further comprises the  
2   step of:  
3                    compensating, by said group delay equalizer circuit, for said group delay  
4   variation verses frequency characteristic of said amplifier circuit to frequencies above 50 GHz.

1           23.    The method of Claim 19, wherein said step of integrating further comprises the  
2 step of:

3                   integrating one or more sections of said group delay equalizer circuit with said  
4 amplifier circuit on said monolithic microwave integrated circuit, each of said sections having  
5 a different group delay response.

1           24.    The method of Claim 23, wherein said step of integrating said one or more  
2 sections further comprises the step of:

3                   placing at least one of said one or more sections at the input of said amplifier  
4 circuit.

1           25.    The method of Claim 23, wherein said step of integrating said one or more  
2 sections further comprises the step of:

3                   placing at least one of said one or more sections at the output of said amplifier  
4 circuit.

1           26.    The method of Claim 23, wherein said step of integrating said one or more  
2 sections further comprises the step of:

3                   placing at least one of said one or more sections between one or more stages of  
4 said amplifier circuit.

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1           27.    The method of Claim 23, wherein said step of integrating said one or more  
2 sections further comprises the step of:

3                   cascading said one or more sections together to form a composite group delay  
4 response capable of compensating for said group delay variation verses frequency  
5 characteristic of said amplifier circuit.

1           28.    The method of Claim 19, wherein said step of integrating further comprises the  
2 step of:

3                   integrating said group delay equalizer circuit with said amplifier circuit on said  
4 monolithic microwave integrated circuit to allow a near constant gain response to be achieved  
5 over the frequency range of said amplifier circuit.

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